

SEQUENCE LISTING

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Hamilton, Bruce

<120> Methods of Purification of Cytochrome P450 Proteins

<130> AHBCP6047252

<140> PCT/GB02/02668

<141> 2002-05-30

<160> 84

<170> PatentIn Ver. 2.1

<210> 1

<211> 1428

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: 2C19 (internal deletion, and His tagged) coding sequence.

<400> 1

atggctaaga aaacgagctc taaagggcgg ccgcctggcc ccactcctct cccagtgatt 60
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atctatggcc ctgtgttcac tctgtatccc ggcctggAAC gcatgggtg gctgcattgg 180
tatgaagtgg tgaaggaAGC cctgattgtat cttggagagg agtttctgg aagaggccat 240
ttcccactgg ctgaaagAGC taacagagga tttggaaatcg ttttcagcaa tggaaagaga 300
tggaaaggaga tccggcgTTT ctccctcatg acgctgcggA attttggat gggaaagagg 360
agcattgagg accgtgttca agaggaAGC cactgccttgc tggaggagtt gagaAAAacc 420
aaggcttcac cctgtatcc cacttcatc ctgggtgttgc ctccctgcaa tggatctgc 480
tccatttattt tccagaaACG tttcgattat aaagatcAGC aatttcttaa cttgatggaa 540
aaatttgaatg aaaacatcAG gattgtAAAGC acccccTGG tccagatATG caataatTTT 600
cccactatca ttgatttattt cccggGAACC cataacAAAT tactttAAAA ctttgctttt 660
atggaaagtG atatTTTGA gaaagtAAA gaacaccaAG aatcgatggA catcaacaAC 720
cctcgggact ttattgattt cttccTgtatc aaaatggAGA aggAAAAGCA aaaccaacAG 780
tctgaattca ctattgaaaa ctggtaatc actgcagctg acttacttgg agctgggaca 840
gagacaacaa gcacaacccCT gagatATGCT ctccttctcc tgctgaagca cccagaggTC 900
acagctaaAG tccagGAAGA gattgaACGT gtcgttggca gaaacccggAG cccctgcATG 960
caggacaggg gccacatGCC ctacacAGAT gctgtggTC acgaggTCca gagatacATC 1020
gaccTcatCC ccaccAGCCT gccccatGCA gtgaccTGTG acgttAAATT cagAAactAC 1080
ctcattccca agggcacaAC catattaACT tccctcactt ctgtgctaca tgacaacAAA 1140
gaatttccca acccagAGAT gttgaccCT cgtcactttc tgcatgaagg tggAAatttt 1200
aagAAAAGTA actacttcat gcctttctca gcaggAAAAC ggatttGTG gggagaggGC 1260
ctggcccgcA tggagctgtt tttattcCTG accttcatt tacagaACT taacctgAAA 1320
tctctgattt acccaaAGGA cttgacaca actcctgttG tcaatggatt tgcttctgtc 1380
ccgccttct accagctctG cttcattcct gtccaccacc accactGA 1428

<210> 2

<211> 475

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Protein
sequence of 2C19 coded by SEQ ID NO: 1

<400> 2

Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Asp Ile Lys Asp Val Ser
20 25 30

Lys Ser Leu Thr Asn Leu Ser Lys Ile Tyr Gly Pro Val Phe Thr Leu
35 40 45

Tyr Phe Gly Leu Glu Arg Met Val Val Leu His Gly Tyr Glu Val Val
50 55 60

Lys Glu Ala Leu Ile Asp Leu Gly Glu Glu Phe Ser Gly Arg Gly His
65 70 75 80

Phe Pro Leu Ala Glu Arg Ala Asn Arg Gly Phe Gly Ile Val Phe Ser
85 90 95

Asn Gly Lys Arg Trp Lys Glu Ile Arg Arg Phe Ser Leu Met Thr Leu
100 105 110

Arg Asn Phe Gly Met Gly Lys Arg Ser Ile Glu Asp Arg Val Gln Glu
115 120 125

Glu Ala His Cys Leu Val Glu Glu Leu Arg Lys Thr Lys Ala Ser Pro
130 135 140

Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn Val Ile Cys
145 150 155 160

Ser Ile Ile Phe Gln Lys Arg Phe Asp Tyr Lys Asp Gln Gln Phe Leu
165 170 175

Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Arg Ile Val Ser Thr Pro
180 185 190

Trp Ile Gln Ile Cys Asn Asn Phe Pro Thr Ile Ile Asp Tyr Phe Pro
195 200 205

Gly Thr His Asn Lys Leu Leu Lys Asn Leu Ala Phe Met Glu Ser Asp
210 215 220

Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp Ile Asn Asn
225 230 235 240

Pro Arg Asp Phe Ile Asp Cys Phe Leu Ile Lys Met Glu Lys Glu Lys
245 250 255

Gln Asn Gln Gln Ser Glu Phe Thr Ile Glu Asn Leu Val Ile Thr Ala
260 265 270

Ala Asp Leu Leu Gly Ala Gly Thr Glu Thr Thr Ser Thr Thr Leu Arg
275 280 285

Tyr Ala Leu Leu Leu Leu Lys His Pro Glu Val Thr Ala Lys Val
290 295 300

Gln Glu Glu Ile Glu Arg Val Val Gly Arg Asn Arg Ser Pro Cys Met
305 310 315 320

Gln Asp Arg Gly His Met Pro Tyr Thr Asp Ala Val Val His Glu Val
325 330 335

Gln Arg Tyr Ile Asp Leu Ile Pro Thr Ser Leu Pro His Ala Val Thr
340 345 350

Cys Asp Val Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly Thr Thr Ile
355 360 365

Leu Thr Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu Phe Pro Asn
370 375 380

Pro Glu Met Phe Asp Pro Arg His Phe Leu His Glu Gly Gly Asn Phe
385 390 395 400

Lys Lys Ser Asn Tyr Phe Met Pro Phe Ser Ala Gly Lys Arg Ile Cys
405 410 415

Val Gly Glu Gly Leu Ala Arg Met Glu Leu Phe Leu Phe Leu Thr Phe
420 425 430

Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Ile Asp Pro Lys Asp Leu
435 440 445

Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro Pro Phe Tyr
450 455 460

Gln Leu Cys Phe Ile Pro Val His His His
465 470 475

<210> 3
<211> 1428
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: 2C19 wild type
1B

<400> 3
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ggaaatatcc tacagataga tattaaggat gtcagcaaat ccttaaccaa tctctcaaaa 120
atctatggcc ctgtgttac tctgtatccc ggcctggaac gcatgggtggt gctgcattgga 180
tatgaagtgg tgaaggaagc cctgattgtat cttggagagg agtttctgg aagaggccat 240

ttcccaactgg ctgaaagagc taacagagga tttggaatcg ttttcagcaa tgaaaagaga 300
tggaaggaga tccggcggtt ctccctcatg acgctgcgga attttggat gggaaagagg 360
agcattgagg accgtgttca agaggaagcc cgctgcctt tgaggaggat gaaaaaaacc 420
aaagcttcac cctgtgatcc cacttcatc ctgggctgtc ctccctgcaa tgtgatctgc 480
tccattattt tccagaaacg tttcgattat aaagatcagc aatttcttaa cttgatggaa 540
aaattgaatg aaaacatcag gattgtaaac acccccttggaa tccagatatg caataattt 600
cccactatca ttgattattt cccggaaacc cataacaaat tactaaaaaa cttgctttt 660
atggaaagtg atattttggaa gaaagtaaaa gaacaccaag aatcgatggaa catcaacaac 720
cctcgggact ttattgattt ctccctgatc aaaatggaga agggaaagca aaaccaacag 780
tctgaattca ctattgaaaaa ctggtaatc actgcagctg acttacttgg agctgggaca 840
gagacaacaa gcacaaccct gagatatgct ctccttctcc tgctgaagca cccagaggc 900
acagctaaag tccaggaaga gattgaacgt gtcgttggca gaaaccggag cccctgcatg 960
caggacaggg gccacatgcc ctacacagat gctgtggtgc acgaggcaca gagatacatc 1020
gacctcatcc ccaccagcct gccccatgca gtgaccctgtc acgttaaatt cagaaactac 1080
ctcattccca agggcacaac catattaact tccctcactt ctgtgctaca tgacaacaaa 1140
gaatttccca acccagagat gtttgcaccct cgtcacttgc tggatgaagg tggaaatttt 1200
aagaaaagta actacttcat gccttctca gcaggaaaac ggatttgtgt gggagaggc 1260
ctggcccgca tggagctgtt tttattcctg accttcattt tacagaactt taacctgaaa 1320
tctctgattt acccaaagga ctttgacaca actcctgtt tcaatggatt tgcttctgctc 1380
ccgccttctc accagctctg cttcattcct gtccaccacc accactga 1428

<210> 4
<211> 475
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Translation of
SEQ ID NO:3

<400> 4
Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Asp Ile Lys Asp Val Ser
20 25 30

Lys Ser Leu Thr Asn Leu Ser Lys Ile Tyr Gly Pro Val Phe Thr Leu
35 40 45

Tyr Phe Gly Leu Glu Arg Met Val Val Leu His Gly Tyr Glu Val Val
50 55 60

Lys Glu Ala Leu Ile Asp Leu Gly Glu Glu Phe Ser Gly Arg Gly His
65 70 75 80

Phe Pro Leu Ala Glu Arg Ala Asn Arg Gly Phe Gly Ile Val Phe Ser
85 90 95

Asn Gly Lys Arg Trp Lys Glu Ile Arg Arg Phe Ser Leu Met Thr Leu
100 105 110

Arg Asn Phe Gly Met Gly Lys Arg Ser Ile Glu Asp Arg Val Gln Glu
115 120 125

Glu Ala Arg Cys Leu Val Glu Glu Leu Arg Lys Thr Lys Ala Ser Pro

130 135 140
Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn Val Ile Cys
145 150 155 160
Ser Ile Ile Phe Gln Lys Arg Phe Asp Tyr Lys Asp Gln Gln Phe Leu
165 170 175
Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Arg Ile Val Ser Thr Pro
180 185 190
Trp Ile Gln Ile Cys Asn Asn Phe Pro Thr Ile Ile Asp Tyr Phe Pro
195 200 205
Gly Thr His Asn Lys Leu Leu Lys Asn Leu Ala Phe Met Glu Ser Asp
210 215 220
Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp Ile Asn Asn
225 230 235 240
Pro Arg Asp Phe Ile Asp Cys Phe Leu Ile Lys Met Glu Lys Glu Lys
245 250 255
Gln Asn Gln Gln Ser Glu Phe Thr Ile Glu Asn Leu Val Ile Thr Ala
260 265 270
Ala Asp Leu Leu Gly Ala Gly Thr Glu Thr Thr Ser Thr Thr Leu Arg
275 280 285
Tyr Ala Leu Leu Leu Leu Lys His Pro Glu Val Thr Ala Lys Val
290 295 300
Gln Glu Glu Ile Glu Arg Val Val Gly Arg Asn Arg Ser Pro Cys Met
305 310 315 320
Gln Asp Arg Gly His Met Pro Tyr Thr Asp Ala Val Val His Glu Val
325 330 335
Gln Arg Tyr Ile Asp Leu Ile Pro Thr Ser Leu Pro His Ala Val Thr
340 345 350
Cys Asp Val Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly Thr Thr Ile
355 360 365
Leu Thr Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu Phe Pro Asn
370 375 380
Pro Glu Met Phe Asp Pro Arg His Phe Leu Asp Glu Gly Gly Asn Phe
385 390 395 400
Lys Lys Ser Asn Tyr Phe Met Pro Phe Ser Ala Gly Lys Arg Ile Cys
405 410 415
Val Gly Glu Gly Leu Ala Arg Met Glu Leu Phe Leu Phe Leu Thr Phe
420 425 430
Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Ile Asp Pro Lys Asp Leu

435

440

445

Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro Pro Phe Tyr
450 455 460

Gln Leu Cys Phe Ile Pro Val His His His His
465 470 475

<210> 5
<211> 1443
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: 2D6 encoding
nucleic acid

<400> 5
atggctaaaa aaacctcttc taaaggccga ccggccggtc cgctgccgt gccaggcctg 60
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cgttcgggt acgtgttctc tctgcagctg gcttggaccc cggttgggt tctgaacgg 180
ctggctgctg ttgcgaaacg tctggttacc cacggtaag acaccgctga ccgtccgccc 240
gtcccgatca cccagatcct gggttttggg ccgcgttccc aaggtttttt cctggctcgt 300
tacggaccgg cttggcgtga acagcgtcgt ttctctgttt ctaccctgcg taacctgggt 360
ctgggtaaaa aatctctgga acagtgggtt accgaagaag ctgcatgcct gtgcgtcgt 420
ttcgcttaacc actctggcgt tccgttccgt ccgaacggc tgctggacaaa agctgtttt 480
aacgttatcg cttctctgac ctgcggccgc cggttcaat acgacgaccc gcgttccctg 540
cgctctgctgg acctggctca ggaaggctg aaagaggagt ctggtttccct gcgtgaagtt 600
ctgaacgctg ttccgggttct gtcgcacatc ccagctctgg ctggtaaagt tctgcgttcc 660
cagaaaagcat tcctgacccca gctggacgaa ctgctgaccg aacaccgtat gacctgggac 720
ccggcgtcagc cgccacgtga cctgaccgaa gctttccctgg ctgaaatgaa aaaagctaaa 780
ggtaacccgg aatctctttt caacgatgaa aatctgcgt a tgcgttgc tgacctgttc 840
tccgcgggta tggtaaccac ctctaccacc ctggcttggg gtctgctgat gatgatcctg 900
caccggatg tacagcgtcg tggtaaccac gaaatcgacg acgttattgg ccagggttcgt 960
cgccggaaa tgggtgacca ggctcacatcg ccgtacacca ccgttccatcc acacgttcc 1020
cagcgcttcg gtgacatcg tccgctgggt atgacccaca tgacctctcg tgacatcgaa 1080
gttcagggtt tccgtatccc gaaaggatacc accctgtatca ccaacctgtc ttctgttctg 1140
aaagacgaag ctgtttgggaaa aaaaaccgttc cggttccatc cggaaacactt cctggacgct 1200
cagggtaact tcgttaaacc ggaaggcttc ctggccgttct ctgctggctg tcgtgcttgc 1260
ctgggtgaaac cgctggctcg tatggaactg ttccgttct tcacctctct gctgcagcac 1320
ttctctttct ctgttccgac cggtcagccg cgccgtctc accacgggtt tttcgcttcc 1380
ctggtttctc cgtctccgta cgaactgtgc gctgttccgc gtggagctca ccaccaccac 1440
tga 1443

<210> 6
<211> 480
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Translation of
SEQ ID NO: 5

<400> 6
Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Leu Pro

1 5 10 15

Leu Pro Gly Leu Gly Asn Leu Leu His Val Asp Phe Gln Asn Thr Pro
20 25 30

Tyr Cys Phe Asp Gln Leu Arg Arg Arg Phe Gly Asp Val Phe Ser Leu
35 40 45

Gln Leu Ala Trp Thr Pro Val Val Val Leu Asn Gly Leu Ala Ala Val
50 55 60

Arg Glu Ala Leu Val Thr His Gly Glu Asp Thr Ala Asp Arg Pro Pro
65 70 75 80

Val Pro Ile Thr Gln Ile Leu Gly Phe Gly Pro Arg Ser Gln Gly Val
85 90 95

Phe Leu Ala Arg Tyr Gly Pro Ala Trp Arg Glu Gln Arg Arg Phe Ser
100 105 110

Val Ser Thr Leu Arg Asn Leu Gly Leu Gly Lys Lys Ser Leu Glu Gln
115 120 125

Trp Val Thr Glu Glu Ala Ala Cys Leu Cys Ala Ala Phe Ala Asn His
130 135 140

Ser Gly Arg Pro Phe Arg Pro Asn Gly Leu Leu Asp Lys Ala Val Ser
145 150 155 160

Asn Val Ile Ala Ser Leu Thr Cys Gly Arg Arg Phe Glu Tyr Asp Asp
165 170 175

Pro Arg Phe Leu Arg Leu Leu Asp Leu Ala Gln Glu Gly Leu Lys Glu
180 185 190

Glu Ser Gly Phe Leu Arg Glu Val Leu Asn Ala Val Pro Val Leu Leu
195 200 205

His Ile Pro Ala Leu Ala Gly Lys Val Leu Arg Phe Gln Lys Ala Phe
210 215 220

Leu Thr Gln Leu Asp Glu Leu Leu Thr Glu His Arg Met Thr Trp Asp
225 230 235 240

Pro Ala Gln Pro Pro Arg Asp Leu Thr Glu Ala Phe Leu Ala Glu Met
245 250 255

Glu Lys Ala Lys Gly Asn Pro Glu Ser Ser Phe Asn Asp Glu Asn Leu
260 265 270

Arg Ile Val Val Ala Asp Leu Phe Ser Ala Gly Met Val Thr Thr Ser
275 280 285

Thr Thr Leu Ala Trp Gly Leu Leu Leu Met Ile Leu His Pro Asp Val
290 295 300

Gln Arg Arg Val Gln Gln Glu Ile Asp Asp Val Ile Gly Gln Val Arg

305 310 315 320
Arg Pro Glu Met Gly Asp Gln Ala His Met Pro Tyr Thr Thr Ala Val
325 330 335
Ile His Glu Val Gln Arg Phe Gly Asp Ile Val Pro Leu Gly Met Thr
340 345 350
His Met Thr Ser Arg Asp Ile Glu Val Gln Gly Phe Arg Ile Pro Lys
355 360 365
Gly Thr Thr Leu Ile Thr Asn Leu Ser Ser Val Leu Lys Asp Glu Ala
370 375 380
Val Trp Glu Lys Pro Phe Arg Phe His Pro Glu His Phe Leu Asp Ala
385 390 395 400
Gln Gly His Phe Val Lys Pro Glu Ala Phe Leu Pro Phe Ser Ala Gly
405 410 415
Arg Arg Ala Cys Leu Gly Glu Pro Leu Ala Arg Met Glu Leu Phe Leu
420 425 430
Phe Phe Thr Ser Leu Leu Gln His Phe Ser Phe Ser Val Pro Thr Gly
435 440 445
Gln Pro Arg Pro Ser His His Gly Val Phe Ala Phe Leu Val Ser Pro
450 455 460
Ser Pro Tyr Glu Leu Cys Ala Val Pro Arg Gly Ala His His His His
465 470 475 480

<210> 7
<211> 1458
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: 3A4

<400> 7
atggcatacg gtactcattc acatggctcg tttaaaaaac tgggaattcc agggccca 60
cctctgcctt ttttggaaaa tattttgtcc taccataagg gctttgtat gtttgacatg 120
gaatgtcata aaaagtatgg aaaagtgtgg ggctttatg atggtaaca gcctgtgctg 180
gctatcacag atcctgacat gatcaaaaca gtgctagtga aagaatgtta ttctgtcttc 240
acaaaccgga ggcctttgg tccagtggta tttatggaa gtgccatctc tatagctgag 300
gatgaagaat ggaagagatt acgatcattt ctgtctccaa ccttcaccag tggaaaactc 360
aaggagatgg tccctatcat tgcccagtat ggagatgtgt tggtgagaaa tctgaggcgg 420
gaagcagaga caggcaagcc tgtcacctt aaagacgtct ttggggccta cagcatggat 480
gtgatcacta gcacatcatt tggagtgaac atcgactctc tcaacaatcc acaagacccc 540
tttgtggaaa acaccaagaa gcttttaaga tttgatttt tggatccatt ctttctctca 600
ataacagtct ttccatttcct catcccaatt cttgaagtat taaatatctg tggatccaa 660
agagaagtta caaattttt aagaaaatct gtaaaaagga tgaaagaaag tcgcctcgaa 720

gatacacaaa agcaccgagt ggatttcctt cagctgatga ttgactctca gaattcaaaa 780
gaaactgagt cccacaaagc tctgtccgat ctggagctcg tggcccaatc aattatctt 840
attttgctg gctatgaaac cacgagcagt gttctctcct tcattatgtt tgaactggcc 900
actcaccctg atgtccagca gaaactgcag gaggaaattt atgcagttt acccaataag 960
gcaccaccca cctatgatac tggctacag atggagttt ttgacatggg ggtgaatgaa 1020
acgctcagat tattccaaat tgctatgaga cttgagaggg tctgaaaaaa agatgtttag 1080
atcaatggga tggtcattcc caaagggggtg gtgggtatgtt ttccaagctt tgctttcac 1140
cgtgacccaa agtactggac agagcctgag aagttcctcc ctgaaagattt cagcaagaag 1200
aacaaggaca acatagatcc ttacatatac acacccttg gaagtggacc cagaaactgc 1260
attggcatga ggtttgtctt catgaacatg aaacttgctc taatcagagt ctttcagaac 1320
ttctcattca aacccctgaa agaaaacacag atcccccgtt aattaagctt aggaggactt 1380
cttcaaccag aaaaaccgtt tggtctaaag gttgagtcaa gggatggcac cgtaagtggaa 1440
gcccaccatc accattgtt 1458

<210> 8
<211> 485
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: 3A4

<400> 8
Met Ala Tyr Gly Thr His Ser His Gly Leu Phe Lys Lys Leu Gly Ile
1 5 10 15

Pro Gly Pro Thr Pro Leu Pro Phe Leu Gly Asn Ile Leu Ser Tyr His
20 25 30

Lys Gly Phe Cys Met Phe Asp Met Glu Cys His Lys Lys Tyr Gly Lys
35 40 45

Val Trp Gly Phe Tyr Asp Gly Gln Gln Pro Val Leu Ala Ile Thr Asp
50 55 60

Pro Asp Met Ile Lys Thr Val Leu Val Lys Glu Cys Tyr Ser Val Phe
65 70 75 80

Thr Asn Arg Arg Pro Phe Gly Pro Val Gly Phe Met Lys Ser Ala Ile
85 90 95

Ser Ile Ala Glu Asp Glu Glu Trp Lys Arg Leu Arg Ser Leu Leu Ser
100 105 110

Pro Thr Phe Thr Ser Gly Lys Leu Lys Glu Met Val Pro Ile Ile Ala
115 120 125

Gln Tyr Gly Asp Val Leu Val Arg Asn Leu Arg Arg Glu Ala Glu Thr
130 135 140

Gly Lys Pro Val Thr Leu Lys Asp Val Phe Gly Ala Tyr Ser Met Asp
145 150 155 160

Val Ile Thr Ser Thr Ser Phe Gly Val Asn Ile Asp Ser Leu Asn Asn
165 170 175

Pro Gln Asp Pro Phe Val Glu Asn Thr Lys Lys Leu Leu Arg Phe Asp
180 185 190

Phe Leu Asp Pro Phe Phe Leu Ser Ile Thr Val Phe Pro Phe Leu Ile
195 200 205

Pro Ile Leu Glu Val Leu Asn Ile Cys Val Phe Pro Arg Glu Val Thr
210 215 220

Asn Phe Leu Arg Lys Ser Val Lys Arg Met Lys Glu Ser Arg Leu Glu
225 230 235 240

Asp Thr Gln Lys His Arg Val Asp Phe Leu Gln Leu Met Ile Asp Ser
245 250 255

Gln Asn Ser Lys Glu Thr Glu Ser His Lys Ala Leu Ser Asp Leu Glu
260 265 270

Leu Val Ala Gln Ser Ile Ile Phe Ile Phe Ala Gly Tyr Glu Thr Thr
275 280 285

Ser Ser Val Leu Ser Phe Ile Met Tyr Glu Leu Ala Thr His Pro Asp
290 295 300

Val Gln Gln Lys Leu Gln Glu Glu Ile Asp Ala Val Leu Pro Asn Lys
305 310 315 320

Ala Pro Pro Thr Tyr Asp Thr Val Leu Gln Met Glu Tyr Leu Asp Met
325 330 335

Val Val Asn Glu Thr Leu Arg Leu Phe Pro Ile Ala Met Arg Leu Glu
340 345 350

Arg Val Cys Lys Lys Asp Val Glu Ile Asn Gly Met Phe Ile Pro Lys
355 360 365

Gly Val Val Val Met Ile Pro Ser Tyr Ala Leu His Arg Asp Pro Lys
370 375 380

Tyr Trp Thr Glu Pro Glu Lys Phe Leu Pro Glu Arg Phe Ser Lys Lys
385 390 395 400

Asn Lys Asp Asn Ile Asp Pro Tyr Ile Tyr Thr Pro Phe Gly Ser Gly
405 410 415

Pro Arg Asn Cys Ile Gly Met Arg Phe Ala Leu Met Asn Met Lys Leu
420 425 430

Ala Leu Ile Arg Val Leu Gln Asn Phe Ser Phe Lys Pro Cys Lys Glu
435 440 445

Thr Gln Ile Pro Leu Lys Leu Ser Leu Gly Gly Leu Leu Gln Pro Glu
450 455 460

Lys Pro Val Val Leu Lys Val Glu Ser Arg Asp Gly Thr Val Ser Gly
465 470 475 480

Ala His His His His
485

<210> 9
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Motif

<400> 9
Ala Lys Lys Thr Ser Ser Lys Gly Arg
1 5

<210> 10
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Leader
sequence

<400> 10
Met Ala Lys Lys Thr Ser Ser Lys Gly Arg
1 5 10

<210> 11
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: N-terminal
sequence of 3A4

<400> 11
Met Ala Tyr Gly Thr His Ser His Gly Leu Phe Lys Lys
1 5 10

<210> 12
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide

<400> 12
caagaggaag cccgctgcct tgtggaggag

<210> 13
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide

<400> 13
ctcctccaca aggcagcggg ctccctttt 30

<210> 14
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide

<400> 14
ccctcgac tttctggatg aaggtggaaa ttttaag 37

<210> 15
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide

<400> 15
ctaaaaattt ccaccttcat ccagaaagtgc acgagg 37

<210> 16
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 16
catatggcta aaaaaacctc ttctaaaggc cgaccgcccgtc 50

<210> 17
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 17
gctgccaggc ctgggtaacc tgctgcatgt ggacttccag aacaccccgta 50

<210> 18
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 18
actgcttcga ccagctgcgt cgtcgttcg gtgacgtgtt ctctctgcag 50

<210> 19
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 19
ctggcttggaa ccccggttgt tttctgaac ggtctggctg ctgttcgcga 50

<210> 20
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 20
agctctggtt acccacggtg aagacaccgc tgaccgtccg ccggtcccga 50

<210> 21
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 21
tcacccagat cctgggtttt ggtccgcgtt cccaaagggtgt tttcctggct 50

<210> 22
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 22
cgttacggac cggcttggcg tgaacagcgt cgtttctctg tttctaccct 50

<210> 23
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 23
gcgtaacctg ggtctgggta aaaaatctct ggaacagtgg gttaccgaag 50

<210> 24
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 24
aagctgcattt cctgtgcgtt gcttcgttta accactctgg tcgtccgttc 50

<210> 25
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 25
cggtccgaacg gtctgctgga caaagctgtt tctaacgtta tcgtttctct 50

<210> 26

<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 26
gacctgcggc cgccgttcg aatacgacga cccgcgttc ctgcgtctgc 50

<210> 27
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 27
tggacctggc tcaggaaggt ctgaaagagg agtctggtt cctgcgtgaa 50

<210> 28
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 28
gttctgaacg ctgttccggc tctgctgcac atcccagctc tggctggtaa 50

<210> 29
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 29
agtctgcgt ttccagaaag cattcctgac ccagctggac gaactgctga 50

<210> 30
<211> 50
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 30
ccgaacacccg tatgacctgg gacccggctc agccgccacg tgacctgacc 50

<210> 31
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 31
gaagctttcc tggctgaaat ggaaaaagct aaaggttaacc cggaatcttc 50

<210> 32
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 32
tttcaacgat gaaaatctgc gtatcggttg tgctgacctg ttctccgegg 50

<210> 33
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 33
gtatggttac cacctctacc accctggctt ggggtctgct gctgatgatc 50

<210> 34
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 34
ctgcacccgg atgtacagcg tcgtgttcag cagggaaatcg acgacgttat 50

<210> 35
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 35
tggccaggtt cgtcgccgg aatgggtga ccaggctcac atgccgtaca 50

<210> 36
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 36
ccaccgctgt tatccacgaa gttcagcgct tcggtgacat cgttccgctg 50

<210> 37
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 37
ggtatgaccc acatgaccc tcgtgacatc gaagttcagg gtttccgtat 50

<210> 38
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 38
cccgaaaggt accaccctga tcaccaacct gtcttctgtt ctgaaagacg 50

<210> 39
<211> 50
<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 39

aagctgttg ggaaaaaccg ttccgttcc atccggaaca cttcctggac

50

<210> 40

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 40

gctcagggtc acttcgttaa accggaagct ttcctgccgt tctctgctgg

50

<210> 41

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 41

tcgtcgtgct tgcctgggtg aaccgctggc tcgtatggaa ctgttcctgt

50

<210> 42

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 42

tcttcacctc tctgctgcag cacttctctt tctctgttcc gaccggtcag

50

<210> 43

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 43
ccgcgtccgt ctcaccacgg ttttcgct ttcctggttt ctccgtctcc 50

<210> 44
<211> 77
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 44
gtcgactcag tgggggtt gagctccacg cgaaacacgcg cacagttcgt acggagacgg 60
agaaaccagg aaagcga 77

<210> 45
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 45
aacaccgtg gtgagacgga cggcgtgac cggtcggAAC agagaaagag 50

<210> 46
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 46
aagtgcgtca gcagagaggt gaagaacagg aacagttcca tacgagccag 50

<210> 47
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 47
cggttacccc aggcaagcac gacgaccacg agagaacggc aggaaagctt 50

<210> 48
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 48
ccggttaac gaagtgaccc tgagcgtcca ggaagtgttc cggatggaaa 50

<210> 49
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 49
cggaacggtt tttcccaaac agttcgtct ttcagaacag aagacaggtt 50

<210> 50
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 50
ggtgatcagg gtggcacctt tcgggatacg gaaaccctga acttcgatgt 50

<210> 51
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 51
cacgagaggt catgtgggtc ataccagcg gaacgatgtc accgaagcgc 50

<210> 52
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 52
tgaacttcgt ggataacagc ggtggtgtac ggcatgtgag cctggtcacc 50

<210> 53
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 53
catttccggc cgacgaacct ggccaataac gtcgtcgatt tcctgctgaa 50

<210> 54
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 54
cacgacgctg tacatccggg tgcaggatca tcagcagcag accccaagcc 50

<210> 55
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 55
agggtggtag aggtggtaac catacccgcg gagaacaggt cagcaacaac 50

<210> 56
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 56
gatacgcaga ttttcatcgt tgaaagaaga ttccgggtta ccttttagctt 50

<210> 57
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 57
tttccatttc agccaggaaa gcttcggtca ggtcacgtgg cggctgagcc 50

<210> 58
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 58
gggtcccagg tcatacggtg ttcggtcagc agttcggtcca gctgggtcag 50

<210> 59
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 59
gaatgcttcc tggaaacgca gaactttacc agccagagct gggatgtgca 50

<210> 60
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 60
gcagaaccgg aacagcgttc agaacttcac gcagggaaacc agactcctct 50

<210> 61

<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 61
ttcagaccaa ttcgagccag gtccaggcaga cgcaggaaac gcgggtcg 50
tc

<210> 62
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 62
gtattcgaaa cggcgccgc aggtcagaga agcgataacg ttagaaacag 50
gt

<210> 63
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 63
ctttgtccag cagaccgttc ggacggaacg gacgaccaga gtggtagcg 50
gt

<210> 64
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 64
aaagcagcgc acaggcatgc agttctcg gtaaccact gttccagaga 50
aa

<210> 65
<211> 50
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 65
ttttttaccc agacccaggt tacgcaggg agaaacagag aaacgacgct 50

<210> 66
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 66
gttcacgcca agccggtccg taacgagcca ggaaaacacc ttgggaacgc 50

<210> 67
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 67
ggacccaaaac ccaggatctg ggtgatcggg accggcggac ggtcagcgg 50

<210> 68
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 68
gtcttcaccg tggtaacca gagttcgcg aacagcagcc agaccgttca 50

<210> 69
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 69
gaacaacaac cgggtccaa gccagctgca gagagaacac gtcaccgaaa 50

<210> 70
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 70
cgacgacgca gctggtcgaa gcagttacggg gtgttctgga agtccacatg 50

<210> 71
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligo used for
the 2D6 assembly

<400> 71
cagcaggtta cccaggcctg gcagcggcag cggaccggc ggtcggcctt 50

<210> 72
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 72
gtaacctggg tctggtaaa aaatctctg 29

<210> 73
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 73
cagagatttt ttacccagac ccaggttac 29

<210> 74
<211> 33
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 74

ggaattcata tggctctcat cccagacttg gcc

33

<210> 75

<211> 47

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 75

tgcggtcgac tcaatggta tggtgggctc cacttacggt gccatcc

47

<210> 76

<211> 69

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 76

ttaacatatg gcatatggta ctcattcaca tggtctgttt aaaaaactgg gaattccagg 60
gccccacacc 69

<210> 77

<211> 475

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: 2C9-FGloop

<400> 77

Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Gly Ile Lys Asp Ile Ser
20 25 30

Lys Ser Leu Thr Asn Leu Ser Lys Val Tyr Gly Pro Val Phe Thr Leu
35 40 45

Tyr Phe Gly Leu Lys Pro Ile Val Val Leu His Gly Tyr Glu Ala Val
50 55 60

Lys Glu Ala Leu Ile Asp Leu Gly Glu Glu Phe Ser Gly Arg Gly Ile
65 70 75 80

Phe Pro Leu Ala Glu Arg Ala Asn Arg Gly Phe Gly Ile Val Phe Ser

85

90

95

Asn Gly Lys Lys Trp Lys Glu Ile Arg Arg Phe Ser Leu Met Thr Leu
100 105 110

Arg Asn Phe Gly Met Gly Lys Arg Ser Ile Glu Asp Arg Val Gln Glu
115 120 125

Glu Ala Arg Cys Leu Val Glu Glu Leu Arg Lys Thr Lys Ala Ser Pro
130 135 140

Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn Val Ile Cys
145 150 155 160

Ser Ile Ile Phe His Lys Arg Phe Asp Tyr Lys Asp Gln Gln Phe Leu
165 170 175

Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Lys Ile Leu Ser Ser Pro
180 185 190

Trp Ile Gln Val Tyr Asn Asn Phe Pro Ala Leu Leu Asp Tyr Phe Pro
195 200 205

Gly Thr His Asn Lys Leu Leu Lys Asn Val Ala Phe Met Lys Ser Tyr
210 215 220

Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp Met Asn Asn
225 230 235 240

Pro Gln Asp Phe Ile Asp Cys Phe Leu Met Lys Met Glu Lys Glu Lys
245 250 255

His Asn Gln Pro Ser Glu Phe Thr Ile Glu Ser Leu Glu Asn Thr Ala
260 265 270

Val Asp Leu Phe Gly Ala Gly Thr Glu Thr Thr Ser Thr Thr Leu Arg
275 280 285

Tyr Ala Leu Leu Leu Leu Lys His Pro Glu Val Thr Ala Lys Val
290 295 300

Gln Glu Glu Ile Glu Arg Val Ile Gly Arg Asn Arg Ser Pro Cys Met
305 310 315 320

Gln Asp Arg Ser His Met Pro Tyr Thr Asp Ala Val Val His Glu Val
325 330 335

Gln Arg Tyr Ile Asp Leu Leu Pro Thr Ser Leu Pro His Ala Val Thr
340 345 350

Cys Asp Ile Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly Thr Thr Ile
355 360 365

Leu Ile Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu Phe Pro Asn
370 375 380

Pro Glu Met Phe Asp Pro His His Phe Leu Asp Glu Gly Gly Asn Phe

385 390 395 400

Lys Lys Ser Lys Tyr Phe Met Pro Phe Ser Ala Gly Lys Arg Ile Cys
405 410 415

Val Gly Glu Ala Leu Ala Gly Met Glu Leu Phe Leu Phe Leu Thr Ser
420 425 430

Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Val Asp Pro Lys Asn Leu
435 440 445

Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro Pro Phe Tyr
450 455 460

Gln Leu Cys Phe Ile Pro Val His His His His
465 470 475

<210> 78

<211> 475

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: 2C9-P220 V60C

<400> 78

Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Gly Ile Lys Asp Ile Ser
20 25 30

Lys Ser Leu Thr Asn Leu Ser Lys Cys Tyr Gly Pro Val Phe Thr Leu
35 40 45

Tyr Phe Gly Leu Lys Pro Ile Val Val Leu His Gly Tyr Glu Ala Val
50 55 60

Lys Glu Ala Leu Ile Asp Leu Gly Glu Glu Phe Ser Gly Arg Gly Ile
65 70 75 80

Phe Pro Leu Ala Glu Arg Ala Asn Arg Gly Phe Gly Ile Val Phe Ser
85 90 95

Asn Gly Lys Lys Trp Lys Glu Ile Arg Arg Phe Ser Leu Met Thr Leu
100 105 110

Arg Asn Phe Gly Met Gly Lys Arg Ser Ile Glu Asp Arg Val Gln Glu
115 120 125

Glu Ala Arg Cys Leu Val Glu Glu Leu Arg Lys Thr Lys Ala Ser Pro
130 135 140

Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn Val Ile Cys
145 150 155 160

Ser Ile Ile Phe His Lys Arg Phe Asp Tyr Lys Asp Gln Gln Phe Leu
165 170 175

Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Lys Ile Leu Ser Ser Pro
180 185 190

Trp Ile Gln Ile Cys Asn Asn Phe Pro Thr Ile Ile Asp Tyr Phe Pro
195 200 205

Gly Thr His Asn Lys Leu Leu Lys Asn Val Ala Phe Met Lys Ser Tyr
210 215 220

Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp Met Asn Asn
225 230 235 240

Pro Gln Asp Phe Ile Asp Cys Phe Leu Met Lys Met Glu Lys Glu Lys
245 250 255

His Asn Gln Pro Ser Glu Phe Thr Ile Glu Ser Leu Glu Asn Thr Ala
260 265 270

Val Asp Leu Phe Gly Ala Gly Thr Glu Thr Thr Ser Thr Thr Leu Arg
275 280 285

Tyr Ala Leu Leu Leu Leu Leu Lys His Pro Glu Val Thr Ala Lys Val
290 295 300

Gln Glu Glu Ile Glu Arg Val Ile Gly Arg Asn Arg Ser Pro Cys Met
305 310 315 320

Gln Asp Arg Ser His Met Pro Tyr Thr Asp Ala Val Val His Glu Val
325 330 335

Gln Arg Tyr Ile Asp Leu Leu Pro Thr Ser Leu Pro His Ala Val Thr
340 345 350

Cys Asp Ile Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly Thr Thr Ile
355 360 365

Leu Ile Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu Phe Pro Asn
370 375 380

Pro Glu Met Phe Asp Pro His His Phe Leu Asp Glu Gly Gly Asn Phe
385 390 395 400

Lys Lys Ser Lys Tyr Phe Met Pro Phe Ser Ala Gly Lys Arg Ile Cys
405 410 415

Val Gly Glu Ala Leu Ala Gly Met Glu Leu Phe Leu Phe Leu Thr Ser
420 425 430

Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Val Asp Pro Lys Asn Leu
435 440 445

Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro Pro Phe Tyr
450 455 460

Gln Leu Cys Phe Ile Pro Val His His His His
465 470 475

<210> 79
<211> 475
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: 2C9-P220

<400> 79
Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Gly Ile Lys Asp Ile Ser
20 25 30

Lys Ser Leu Thr Asn Leu Ser Lys Val Tyr Gly Pro Val Phe Thr Leu
35 40 45

Tyr Phe Gly Leu Lys Pro Ile Val Val Leu His Gly Tyr Glu Ala Val
50 55 60

Lys Glu Ala Leu Ile Asp Leu Gly Glu Glu Phe Ser Gly Arg Gly Ile
65 70 75 80

Phe Pro Leu Ala Glu Arg Ala Asn Arg Gly Phe Gly Ile Val Phe Ser
85 90 95

Asn Gly Lys Lys Trp Lys Glu Ile Arg Arg Phe Ser Leu Met Thr Leu
100 105 110

Arg Asn Phe Gly Met Gly Lys Arg Ser Ile Glu Asp Arg Val Gln Glu
115 120 125

Glu Ala Arg Cys Leu Val Glu Glu Leu Arg Lys Thr Lys Ala Ser Pro
130 135 140

Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn Val Ile Cys
145 150 155 160

Ser Ile Ile Phe His Lys Arg Phe Asp Tyr Lys Asp Gln Gln Phe Leu
165 170 175

Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Lys Ile Leu Ser Ser Pro
180 185 190

Trp Ile Gln Ile Cys Asn Asn Phe Pro Thr Ile Ile Asp Tyr Phe Pro
195 200 205

Gly Thr His Asn Lys Leu Leu Lys Asn Val Ala Phe Met Lys Ser Tyr
210 215 220

Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp Met Asn Asn
225 230 235 240

Pro Gln Asp Phe Ile Asp Cys Phe Leu Met Lys Met Glu Lys Glu Lys
245 250 255

His Asn Gln Pro Ser Glu Phe Thr Ile Glu Ser Leu Glu Asn Thr Ala
260 265 270

Val Asp Leu Phe Gly Ala Gly Thr Glu Thr Thr Ser Thr Thr Leu Arg
275 280 285

Tyr Ala Leu Leu Leu Leu Lys His Pro Glu Val Thr Ala Lys Val
290 295 300

Gln Glu Glu Ile Glu Arg Val Ile Gly Arg Asn Arg Ser Pro Cys Met
305 310 315 320

Gln Asp Arg Ser His Met Pro Tyr Thr Asp Ala Val Val His Glu Val
325 330 335

Gln Arg Tyr Ile Asp Leu Leu Pro Thr Ser Leu Pro His Ala Val Thr
340 345 350

Cys Asp Ile Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly Thr Thr Ile
355 360 365

Leu Ile Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu Phe Pro Asn
370 375 380

Pro Glu Met Phe Asp Pro His His Phe Leu Asp Glu Gly Gly Asn Phe
385 390 395 400

Lys Lys Ser Lys Tyr Phe Met Pro Phe Ser Ala Gly Lys Arg Ile Cys
405 410 415

Val Gly Glu Ala Leu Ala Gly Met Glu Leu Phe Leu Phe Leu Thr Ser
420 425 430

Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Val Asp Pro Lys Asn Leu
435 440 445

Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro Pro Phe Tyr
450 455 460

Gln Leu Cys Phe Ile Pro Val His His His His
465 470 475

<210> 80
<211> 475
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: 2C9-FG
Loop-K206E

<400> 80

Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Gly Ile Lys Asp Ile Ser
20 25 30

Lys Ser Leu Thr Asn Leu Ser Lys Val Tyr Gly Pro Val Phe Thr Leu
35 40 45

Tyr Phe Gly Leu Lys Pro Ile Val Val Leu His Gly Tyr Glu Ala Val
50 55 60

Lys Glu Ala Leu Ile Asp Leu Gly Glu Glu Phe Ser Gly Arg Gly Ile
65 70 75 80

Phe Pro Leu Ala Glu Arg Ala Asn Arg Gly Phe Gly Ile Val Phe Ser
85 90 95

Asn Gly Lys Lys Trp Lys Glu Ile Arg Arg Phe Ser Leu Met Thr Leu
100 105 110

Arg Asn Phe Gly Met Gly Lys Arg Ser Ile Glu Asp Arg Val Gln Glu
115 120 125

Glu Ala Arg Cys Leu Val Glu Glu Leu Arg Lys Thr Lys Ala Ser Pro
130 135 140

Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn Val Ile Cys
145 150 155 160

Ser Ile Ile Phe His Lys Arg Phe Asp Tyr Lys Asp Gln Gln Phe Leu
165 170 175

Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Glu Ile Leu Ser Ser Pro
180 185 190

Trp Ile Gln Val Tyr Asn Asn Phe Pro Ala Leu Leu Asp Tyr Phe Pro
195 200 205

Gly Thr His Asn Lys Leu Leu Lys Asn Val Ala Phe Met Lys Ser Tyr
210 215 220

Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp Met Asn Asn
225 230 235 240

Pro Gln Asp Phe Ile Asp Cys Phe Leu Met Lys Met Glu Lys Glu Lys
245 250 255

His Asn Gln Pro Ser Glu Phe Thr Ile Glu Ser Leu Glu Asn Thr Ala
260 265 270

Val Asp Leu Phe Gly Ala Gly Thr Glu Thr Thr Ser Thr Thr Leu Arg
275 280 285

Tyr Ala Leu Leu Leu Leu Lys His Pro Glu Val Thr Ala Lys Val
290 295 300

Gln Glu Glu Ile Glu Arg Val Ile Gly Arg Asn Arg Ser Pro Cys Met
305 310 315 320

Gln Asp Arg Ser His Met Pro Tyr Thr Asp Ala Val Val His Glu Val
325 330 335

Gln Arg Tyr Ile Asp Leu Leu Pro Thr Ser Leu Pro His Ala Val Thr
340 345 350

Cys Asp Ile Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly Thr Thr Ile
355 360 365

Leu Ile Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu Phe Pro Asn
370 375 380

Pro Glu Met Phe Asp Pro His His Phe Leu Asp Glu Gly Gly Asn Phe
385 390 395 400

Lys Lys Ser Lys Tyr Phe Met Pro Phe Ser Ala Gly Lys Arg Ile Cys
405 410 415

Val Gly Glu Ala Leu Ala Gly Met Glu Leu Phe Leu Phe Leu Thr Ser
420 425 430

Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Val Asp Pro Lys Asn Leu
435 440 445

Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro Pro Phe Tyr
450 455 460

Gln Leu Cys Phe Ile Pro Val His His His His
465 470 475

<210> 81

<211> 494

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: 2C9 wild type
P450

<400> 81

Met Asp Ser Leu Val Val Leu Val Cys Leu Ser Cys Leu Leu Leu
1 5 10 15

Leu Ser Leu Trp Arg Gln Ser Ser Gly Arg Gly Lys Leu Pro Pro Gly
20 25 30

Pro Thr Pro Leu Pro Val Ile Gly Asn Ile Leu Gln Ile Gly Ile Lys
35 40 45

Asp Ile Ser Lys Ser Leu Thr Asn Leu Ser Lys Val Tyr Gly Pro Val
50 55 60

Phe Thr Leu Tyr Phe Gly Leu Lys Pro Ile Val Val Leu His Gly Tyr

65	70	75	80
Glu Ala Val Lys Glu Ala Leu Ile Asp Leu Gly		Glu Glu Phe Ser Gly	
85		90	95
Arg Gly Ile Phe Pro Leu Ala Glu Arg Ala Asn Arg	Gly Phe Gly Ile		
100	105		110
Val Phe Ser Asn Gly Lys Lys Trp Lys Glu Ile Arg Arg	Phe Ser Leu		
115	120	125	
Met Thr Leu Arg Asn Phe Gly Met Gly Lys Arg Ser Ile	Glu Asp Arg		
130	135	140	
Val Gln Glu Glu Ala Arg Cys Leu Val Glu Glu Leu Arg Lys Thr	Lys		
145	150	155	160
Ala Ser Pro Cys Asp Pro Thr Phe Ile Leu Gly Cys Ala Pro Cys Asn			
165	170	175	
Val Ile Cys Ser Ile Ile Phe His Lys Arg Phe Asp Tyr Lys Asp Gln			
180	185	190	
Gln Phe Leu Asn Leu Met Glu Lys Leu Asn Glu Asn Ile Lys Ile Leu			
195	200	205	
Ser Ser Pro Trp Ile Gln Ile Cys Asn Asn Phe Ser Pro Ile Ile Asp			
210	215	220	
Tyr Phe Pro Gly Thr His Asn Lys Leu Leu Lys Asn Val Ala Phe Met			
225	230	235	240
Lys Ser Tyr Ile Leu Glu Lys Val Lys Glu His Gln Glu Ser Met Asp			
245	250	255	
Met Asn Asn Pro Gln Asp Phe Ile Asp Cys Phe Leu Met Lys Met Glu			
260	265	270	
Lys Glu Lys His Asn Gln Pro Ser Glu Phe Thr Ile Glu Ser Leu Glu			
275	280	285	
Asn Thr Ala Val Asp Leu Phe Gly Ala Gly Thr Glu Thr Thr Ser Thr			
290	295	300	
Thr Leu Arg Tyr Ala Leu Leu Leu Leu Lys His Pro Glu Val Thr			
305	310	315	320
Ala Lys Val Gln Glu Glu Ile Glu Arg Val Ile Gly Arg Asn Arg Ser			
325	330	335	
Pro Cys Met Gln Asp Arg Ser His Met Pro Tyr Thr Asp Ala Val Val			
340	345	350	
His Glu Val Gln Arg Tyr Ile Asp Leu Leu Pro Thr Ser Leu Pro His			
355	360	365	
Ala Val Thr Cys Asp Ile Lys Phe Arg Asn Tyr Leu Ile Pro Lys Gly			

370

375

380

Thr Thr Ile Leu Ile Ser Leu Thr Ser Val Leu His Asp Asn Lys Glu
385 390 395 400

Phe Pro Asn Pro Glu Met Phe Asp Pro His His Phe Leu Asp Glu Gly
405 410 415

Gly Asn Phe Lys Lys Ser Lys Tyr Phe Met Pro Phe Ser Ala Gly Lys
420 425 430

Arg Ile Cys Val Gly Glu Ala Leu Ala Gly Met Glu Leu Phe Leu Phe
435 440 445

Leu Thr Ser Ile Leu Gln Asn Phe Asn Leu Lys Ser Leu Val Asp Pro
450 455 460

Lys Asn Leu Asp Thr Thr Pro Val Val Asn Gly Phe Ala Ser Val Pro
465 470 475 480

Pro Phe Tyr Gln Leu Cys Phe Ile Pro Val His His His His
485 490

<210> 82

<211> 40

<212> PRT

<213> Homo sapiens

<400> 82

Met Asp Ser Leu Val Val Leu Val Cys Leu Ser Cys Leu Leu Leu
1 5 10 15

Leu Ser Leu Trp Arg Gln Ser Ser Gly Arg Gly Lys Leu Pro Pro Gly
20 25 30

Pro Thr Pro Leu Pro Val Ile Gly
35 40

<210> 83

<211> 21

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: 2C9 and 2C19
truncation

<400> 83

Met Ala Lys Lys Thr Ser Ser Lys Gly Arg Pro Pro Gly Pro Thr Pro
1 5 10 15

Leu Pro Val Ile Gly
20

<210> 84
<211> 40
<212> PRT
<213> Homo sapiens

<400> 84
Met Asp Pro Phe Val Val Leu Val Leu Cys Leu Ser Cys Leu Leu Leu
1 5 10 15
Leu Ser Ile Trp Arg Gln Ser Ser Gly Arg Gly Lys Leu Pro Pro Gly
20 25 30
Pro Thr Pro Leu Pro Val Ile Gly
35 40